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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,437	01/28/2004	Michael Joseph Reale	140069	3602

7590 02/08/2007
John S. Beulick
Armstrong Teasdale LLP
Suite 2600
One Metropolitan Square
St. Louis, MO 63102

EXAMINER

KIM, TAE JUN

ART UNIT	PAPER NUMBER
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3746

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Dr

Office Action Summary	Application No.	Applicant(s)	
	10/766,437	REALE ET AL.	
	Examiner	Art Unit	
	Ted Kim	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06/01/2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 21-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>09/05/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/11/2006 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zaugg (4,522,024) in view of Payling (6,467,252) and optionally Tsukamoto et al (6,397,578).

Zaugg teaches a cooling system for a gas turbine engine that includes at least a first compressor 3, a second compressor 3, and a turbine 1, said cooling system comprising: an intercooler 5 (left) coupled downstream from the first compressor such that compressed air discharged from the first compressor is routed therethrough, said intercooler having a working fluid flowing therethrough; and an injection system 16

coupled in flow communication with said intercooler 5, said injection system configured to channel condensate 10 formed in said intercooler into the combustor 9; further comprising a condensate holding tank 11 in flow communication with said intercooler, said condensate holding tank configured to receive said condensate formed in said intercooler; further comprising a first pump 12 coupled in flow communication with said condensate holding tank; said first pump directs said condensate to a second holding tank 13; further comprising a second pump 15, different than said first pump, in flow communication with said second holding tank, said second pump configured to channel condensate from said second holding tank to said condensate injection system 9. Zaugg does not teach injecting the water from the condensate into an injection system circumferentially spaced at the inlet of the second compressor nor the use of a demineralizer nor an annular manifold to supply the condensate to the nozzles coupled to the manifold. Payling et al teach using an intercooler 68 between the compression stages 52 or 202 (Fig. 6) or 254 (Fig. 8) followed by 54 or 204 (Fig. 6) or 258 (Fig. 8) and using an annular manifold 212, connected to water injectors/nozzles 222 (see Fig. 6) or annular manifold 264, connected to the water injectors/nozzles 266 (see Fig. 8) coupled to a plurality of nozzles that inject water via circumferentially spaced injectors/nozzles between the first 52 or 202 (Fig. 6) or 254 (Fig. 8) and second 54 or 204 (Fig. 6) or 258 (Fig. 8) compressors where the water injection serves to cool the compressor air, reduce compressor horsepower used and increase engine output levels (col. 2, lines 40-57). The demineralized water (col. 10, lines 16+) is pumped to the water injection system. It

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would have been obvious to one of ordinary skill in the art to inject the water between the compressor stages, as taught by Payling, in order to cool the compressor air, cool the compressor air, reduce compressor horsepower used and increase engine output levels.

Upon combination the intercooler is configured to discharge both the condensate and cooled compressed air to the second compressor. As for the demineralizer, Tsukamoto et al teach using a demineralizer 16 upstream of the pump 17 for the condensate from 15 which is recirculated back into the gas turbine. It would have been obvious to one of ordinary skill in the art to employ a demineralizer before the pump 12 of Zaugg, in order to purify the water and reduce corrosion and/or fouling of the water injectors/nozzles.

4. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Payling et al (6,467,252) in view of either Zaugg (4,522,024) or EP 524435 and optionally Tsukamoto et al (6,397,578). Payling et al teach a cooling system for a gas turbine engine that includes at least a first compressor 52 or 202 (Fig. 6) or 254 (Fig. 8), a second compressor 54 or 204 (Fig. 6) or 258 (Fig. 8), and a turbine 58, said cooling system comprising: an intercooler 68 coupled downstream from the first compressor such that compressed air discharged from the first compressor is routed therethrough, said intercooler having a working fluid flowing therethrough; and an injection system 64 or 206 (Fig. 6) or 260 (Fig. 8), said injection system configured to channel water to an annular manifold 212 connected to water injectors/nozzles 222 (see Fig. 6) or annular manifold 264 connected to the water injectors/nozzles 266 (see Fig. 8) to facilitate supplying water to the plurality of nozzles coupled to the manifold and

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ejecting/channeling water into the second compressor 54 or 204 (Fig. 6) or 258 (Fig. 8) at a predetermined rate to facilitate reducing an operating temperature of the gas turbine engine; a second pump 352 for pumping demineralized water (col. 10, lines 16+) to the injection system. Payling et al do not teach using the water condensed from the intercooler for the water that is injected into the second compressor. Zaugg teaches a cooling system for a gas turbine engine that includes at least a first compressor 3, a second compressor 3, and a turbine 1, said cooling system comprising: an intercooler 5 (left) coupled downstream from the first compressor such that compressed air discharged from the first compressor is routed therethrough, said intercooler having a working fluid flowing therethrough; and an injection system 16 coupled in flow communication with said intercooler 5, said injection system configured to channel condensate 10 formed in said intercooler into the combustor 9; further comprising a condensate holding tank 11 in flow communication with said intercooler, said condensate holding tank configured to receive said condensate formed in said intercooler; further comprising a first pump 12 coupled in flow communication with said condensate holding tank; said first pump directs said condensate to a second holding tank 13; further comprising a second pump 15, different than said first pump, in flow communication with said second holding tank, said second pump configured to channel condensate from said second holding tank to said condensate injection system 9. Zaugg clearly teaches that the water is condensed into the intercooler 5 and the condensate is conveniently recirculated back into the gas turbine system, which reduces the demand for external water (col. 1, lines 64+) and

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enhances the thermodynamic efficiency. EP '545 teach removing the water from the intercoolers 14, 18 and directing the condensate to a condensate holding tank 28 and pumping the water via pump 30 to the inlet of the 2nd compressor (first stage of 16), the 1st compressor being regarded as the supercharger 12—which it is noted is also a compressor of small pressure ratio (see col. 2, lines 27+). The use of condensate reduces the cost of fresh water and reduces treatment costs (col. 4, lines 10-15) and the water injection in the 2nd compressor increases the capacity and increases efficiency (col. 4, lines 35-47) It would have been obvious to one of ordinary skill in the art to use the condensate from the intercooler of Payling et al, as taught by either Zaugg or EP '545, in order to reduce the demand for external water and enhance the overall thermodynamic efficiency. Upon combination the intercooler is configured to discharge both the condensate and cooled compressed air to the second compressor. As for the demineralizer, Tsukamoto et al teach using a demineralizer 16 upstream of the pump 17 for the condensate from 15 which is recirculated back into the gas turbine. It would have been obvious to one of ordinary skill in the art to employ a demineralizer before the pump 12 of Zaugg, in order to purify the water and reduce corrosion and/or fouling of the water injectors/nozzles.

Response to Arguments

5. Applicant's amendments filed 12/11/2006 are not persuasive.
6. Applicant's arguments concerning the combination of Zaugg and Payling et al or vice versa, take the citation of Zaugg out of context.

Further, in contrast to the assertion on pages 3 and 4 of the Office Action that “[i]t would have been obvious to one of ordinary skill in the art to inject the water between the compressor stages, as taught by Payling”, Zaugg specifically teaches against injecting water into the compressor stages. Specifically, Zaugg recites that “[i]n order to avoid disturbances in the machines and apparatuses, [the] condensate must be removed from the compressor-circuit by water separators.” (Column 1, lines 37-39) Zaugg further recites that “[t]he present invention is to use this condensate in an advantageous manner...for injection into the combustion chamber of the turbine.” (Column 1, lines 48-51) As such, the purpose of Zaugg is to remove water from the compressor stages and to utilize the water within the combustor stages. Therefore, in contrast to the assertion in the Office Action, it would not have been obvious to combine Zaugg and Payling, which describes injecting water into the compressor.

Applicant ignores the teaching of Zaugg immediately prior to this (see col. 1, lines 18-36) which elucidates the problem which Zaugg is solving, i.e. the condensate is taught as being removed from prior art devices, because the condensate is formed when intercooling and compressing. While the liquid condensate is extracted from the condensers and used in the combustor, there is no teaching away from using this type of condensate in the 2nd compressor, when combined with Payling. Applicant’s argument that the condensate must be removed from the intercooler is not equivalent to remove all the water from the compressor stages. Rather, the intercooler and aftercooler would have the water removed. This does not equate to a teaching that water must be completely removed from the 2nd compressor. Note that Zaugg specifically teaches that the water remains even after the removal process, giving an example of 1/50 of the original water still remains in the air after water is separated (see col. 1, lines 28-36). Hence, water would is still taught as being present in the 2nd compressor. Furthermore, note that in

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combination, the water/condensate injected into the 2nd compressor of Payling is sprayed and evaporated in the 2nd compressor (see e.g. col. 5, lines 38+) and thus serves to increase the power and efficiency of the 2nd compressor. The 2nd compressor of Zaugg having reduced humidity due to the condensation in the intercooler stages would thus have a large capacity for receiving sprayed water. In combination, these references fairly teach the claimed invention.

Moreover, the converse arrangement of Payling et al in view of Zaugg would modify only the source of the water, i.e. to condense the water from the intercooler. As pointed out by applicant, Zaugg teaches this is highly desirable. In combination, these references fairly teach the claimed invention.

7. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Contact Information


Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

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The fax numbers for the organization where this application is assigned are 571-273-8300.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thorpe, can be reached at 571-272-4444. Alternate inquiries to Technology Center 3700 can be made via 571-272-3700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at <http://www.uspto.gov/main/patents.htm>



Ted Kim	Telephone	571-272-4829
Primary Examiner	Fax (Regular)	571-273-8300
February 1, 2007	Fax (After Final)	571-273-8300
Technology Center 3700	Telephone	571-272-3700
Patents Assistance Center	Telephone	800-786-9199